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CONTRIBUTIONS TOWARD A FLORA OF NEVADA

NO. 35

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CAPPARIDACEAE OF NEVADA

by

HUGH H. ILTIS

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Address all inquiries concerning this series
to W. Andrew Archer, Plant Industry Station,
Beltsville, Maryland.

OLEOMELLA HILLMANII A. Nelson
from A. A. Heller 9596, Reno.
2/3 nat. size. Drawn by Iltis

Errata

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20 up	10	cm.	mm.

CAPPARIDACEAE[1] OF NEVADA

By Hugh H. Iltis[2]

Herbs (our species), shrubs, or trees, ours all with a strong, more or less fetid, rank odor; leaves alternate, petiolate, ours palmately compound, with 3 or 5 leaflets (Cleome lutea) or rarely simple, entire, ours usually stipulate (except Cleome platycarpa), the stipules minute, setaceous, scarious. Flowers perfect, or rarely by partial cyclic abortion unisexual, more or less zygomorphic, pedicellate, rarely subsessile, usually in racemes, less frequently axillary and solitary, or in dense axillary raceme clusters; racemes bracteate or, by reduction, ebracteate. Calyx lobes or sepals usually 4, minute and smaller than petals; petals 4, sessile to clawed, distinct, the two posterior frequently larger; nectariferous disk between corolla and androecium frequently present; stamens 6-16 (in ours), or many, equal to the petals or usually exserted, the anthers dehiscing longitudinally; pistil 1, borne on a short or long stipe (gynophore); ovary

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[1]Specimens in the following herbaria have been examined for this study: Univ. of Nevada and Nevada Agricultural Experiment Station, Reno, Nevada; U. S. National Herbarium, Washington; U. S. National Arboretum, Beltsville, Md.; and Missouri Botanical Garden, St. Louis.

[2]Department of Botany and Bacteriology, University of Arkansas, Fayetteville, Arkansas.

superior, unilocular, or (in Wislizenia and Oxystylis) falsely bilocular; carpels 2; placentation typically parietal; ovules few to many, campylotropous. Style 1, short to filiform; stigma (in ours) truncate. Fruits various, in Nevada either few- to many-seeded, 2-valved capsules (siliques or silicles), dehiscing by the separation of the valves from the slender, hoop-shaped placenta (replum), or 2-valved schizocarps (Wislizenia, Oxystylis) with the valves separating from the placenta as 1- to 2-seeded, closed nutlets. Seeds reniform, with the testa deeply invaginated; embryo curved, conduplicate; endosperm scanty; ours exarillate.

The 12 species in Nevada are all of the subfamily Cleomoideae.

KEY TO GENERA

1. Stamens 8-16, unequal. Corolla open in bud. Petals whitish, notched. Gland strictly adaxial with bright orange, concave apex. Style filiform and soft, deciduous in fruit. Siliques erect, subsessile, dehiscing apically, the hirsute-glandular valves persistent. Cleft of seed open . . . . . 1. POLANISIA

1. Stamens 6, equal. Corolla closed (imbricate) in bud. Petals yellow, pink, or rarely white, rounded to pointed at the apex. Gland (if present) more or less concentric, though often expanded adaxially. Style setaceous, persistent in fruit. Fruit pendent or rarely erect, usually borne on an elongate gynophore, the valves freely deciduous. Cleft of seed closed, the two claws fused for most of their length.

2. Fruits elongate siliques (pods) or short, round or laterally

expanded silicles, unilocular, the seeds and valves falling free and separate. Racemes bracteate.

3. Fruits many-seeded siliques, 10-80 mm. long. Plants usually 2-20 dm. tall . . . . . 2. CLEOME

3. Fruits few-seeded silicles, 2-8 mm. long. Plants usually 0.4-3.0 (-5.0) dm. tall . . . . . 3. CLEOMELLA

2. Fruits falsely bilocular, didymous schizocarps, with each of the 2 valves closely and permanently enclosing its single (rarely 2) seed and falling away with it, forming 2 nutlets, each 2-3 mm. long. Racemes ebracteate.

4. Racemes terminal on the several to many slender branches. Fruiting pedicels and gynophores slender, each about 5 mm. long. Fruiting styles slender, 3-5 mm. long. S.-central Nevada (Pahranagat Valley). . . . . 4. WISLIZENIA

4. Racemes in strongly congested, stout, axillary, sessile clusters, borne on the usually unbranched main stems. Fruiting pedicels and gynophores stout, each about 1 mm. long. Fruiting styles stout, 6-10 mm. long. SW. Nevada (Death Valley region; Coaldale alkali flats). 5. OXYSTYLIS

1. POLANISIA Raf., Am. Jour. Sci. 1: 378. 1819.

Jacksonia Raf., Med. Rep. II. 5: 352. 1808, nom. nud.

Polanisia Sect. EUPOLANISIA Endl., Gen. Plant. 891. 1838.

Cleome Sect. POLANISIA (Raf.) Baill., Hist. Plant. 3: 149. 1872.

Erect, unarmed, slender to robust annual (ours), to 10 dm. tall, viscid-pubescent with rank odor, simple or branched. Leaves 3-foliolate,

petiolate; leaflets entire, to 6 cm. long; stipules minute or obsolete. Racemes terminal, strongly elongating in fruit, the 1-foliolate bracts smaller than the leaves. Corolla open in the bud; sepals free to the base, deciduous; petals spatulate with a long claw (ours) or obovate, emarginate to erose or laciniate, white to pale pink, the posterior pair longer; gland between corolla and androecium prominent, strictly adaxial, either solid and with concave apex or tubular, orange or red; stamens 8-16, of unequal length because of staggered maturation; style slender. Fruit a many-seeded, elongate silique, erect, sessile or subsessile; valves dehiscing apically, persistent in fruit. Seeds subspherical, smooth, dull, the cleft formed by the deep invagination of the testa narrow but open.

Endemic to North America (6 species); one species in Nevada.

1. POLANISIA TRACHYSPERMA Torr. & Gray, Fl. N. Amer. 1: 669. 1840. (FIG. 1 a)

Jacksonia trachysperma (Torr. & Gray) Greene, Pittonia 2: 174. 1891.

Cleome trachysperma (Torr. & Gray) Pax & Hoffm. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 17^b: 215. 1936.

Sparsely branched herbs, 2-5 dm. tall. Leaflets elliptic, oblanceolate to obovate, 10-20 mm. long, 5-15 mm. wide; petioles 1-3 cm. long; bracts ovate, subsessile. Sepals 3 mm. long, lanceolate to ovate, purplish, deciduous; petals spatulate with slender claw, deeply notched at the apex, 6-7 mm. long, white; gland solid, about 2 mm. long, with a concave, bright orange apex; stamens 8-16, purple, 9-11 mm.

long; style slender, purplish, 4-6 mm. long, soft, deciduous or withering in fruit. Silique oblong-fusiform, 25-50 mm. long, 4-6 mm. thick; valves strongly reticulate-veined, papyraceous, dehiscing apically for 1-2 cm., the seeds shaken out by the wind; pedicel 15-20 mm. long; seeds many, suborbicular, 1.7-2.0 mm. diam., rusty brown.

Flowers in Nevada from June to September.

Gravelly and sandy washes or canyons; at 4200-6500 ft. elev.

Nevada: Clark (Charleston Mts.[1]), Lincoln (S. of Caliente) and Washoe (Truckee Valley, fide Watson, King Exped. 5 (Bot.): 34. 1871.) Counties.

Widespread in the Rocky Mountains area, S. to Texas and Arizona, where it imperceptibly grades into the Mexican P. uniglandulosa (Cav.) DC., and E. to the Mississippi, where it intergrades with the northeastern P. dodecandra (L.) DC. All three taxa are perhaps best treated as subspecies of P. dodecandra.

2. CLEOME L., Sp. Pl. ed. 1. 671. 1753.

Of world-wide distribution; all our species belong to Sect. PERITOMA (DC.) Baill., a description of which follows.

Peritoma DC., Prodr. 1: 237. 1824.

Cleome Sect. PERITOMA (DC.) Baill., Hist. Plant. 3: 149. 1872.

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[1]If only one specimen has been collected from a county, its location is noted in parentheses. If more than one collection has been examined, no specific locations are given here. The distributions (fig. 1 & 2) were plotted on outline maps furnished through the courtesy of Dr. Marion Ownbey, Washington State College, Pullman, Washington.

Erect, unarmed, slender to robust annuals to 20 dm. tall, glabrous (except C. platycarpa), often glaucous. Leaves (1-) 3- to 5-foliolate; leaflets entire, mucronate, less than 6 cm. long, stipulate (except C. platycarpa), the stipules minute, filiform. Racemes terminal, strongly elongating in fruit, the bracts (in our species) usually 1-foliolate, much smaller than the leaves. Corolla closed in bud; petals sessile or subsessile, (4-) 6-12 (-17) mm. long; disk obsolete (C. platycarpa) or fleshy and cylindric below, more or less abruptly expanded above, produced adaxially into a gibbous or flattened appendage. Stamens 6, the anthers tightly coiled when dry. Fruits elongate; siliques borne on distinct gynophores; styles persistent, becoming indurate and setaceous in fruit; seeds many, free-falling, the two claws fused nearly their whole length by a hard membrane (of the testa?), without any (or only a very minute) internal sinus between them, the testa smooth or colliculate, frequently with soft, blister-like verrucae, often mottled.

Sect. PERITOMA, with 6 species, is restricted to W. North America.

KEY TO SPECIES

1. Plants pubescent. Disk lacking. Siliques strongly compressed, broadly oblongoid. Seeds smooth, brownish-black when mature. Flowers yellow. Leaflets 3, flat . . . . . 1. C. PLATYCARPA

1. Plants essentially glabrous. Disk well developed. Siliques terete or slightly compressed, linear-cylindric to fusiform. Seeds finely colliculate, frequently blistered and mottled, yellowish

to dark-brownish. Leaflets (1-) 3-5, more or less strongly conduplicate.

2. Siliques deflexed or pendulous on gynophores 6-23 mm. long. Petals without a basal gland. Leaflets 2-6 cm. long. Sepals basally united for 1/3 to 2/3 their length. Seeds 1.5-2.0 mm. thick, slightly compressed.

3. Petals yellow. Leaflets 5 . . . . . 2. C. LUTEA

3. Petals purple to pink, rarely white. Leaflets 3. 3. C. SERRULATA

2. Siliques erect or strongly ascending, on gynophores 3-6 mm. long. Petals bearing a scale-like gland on their inner base. Leaflets 0.3-1.1 mm. long. Sepals free to the base or nearly so. Seeds about 0.5 mm. thick, strongly compressed. Petals greenish or yellowish . . . . . 4. C. SPARSIFOLIA

1. CLEOME PLATYCARPA Torr. in Rep. U. S. Expl. (Wilkes) Exped. 17: 235, t. 2. 1874. (FIG. 1 b)

Celome platycarpa (Torr.) Greene, Pittonia 4: 210. 1900.

Erect glandular-pubescent, annual herb, 1-6 dm. tall, simple or sparsely branched. Leaflets 3, broadly ovate- to obovate-elliptic, 1-3 cm. long, 0.3-1.4 cm. wide. Flowers yellow in dense racemes; sepals free to the base, narrowly linear-lanceolate, caudate-acuminate, deciduous; disk obsolete. Fruit strongly compressed, narrowly to broadly oblong-elliptic, acute to rounded at both ends, 1-3 cm. long, 0.5-1.2 cm. wide, about 3 mm. thick; gynophore 11-19 mm. long; pedicel 10-17 mm. long. Seeds suborbicular, 2.8-3.3 mm. long, brownish-black,

smooth, shiny.

Flowers in Nevada from end of April into August.

In sand, loam or clay, alkaline desert soils of playas, dry foothills, or in cleared fields, sometimes in sagebrush; in Nevada at 4200 to 6400 ft. elev.

Nevada: Douglas (Tim Smith), Elko (S. of Elko), Eureka (Buckthorn), Ormsby (Carson City) and Washoe Counties.

Also Oregon and N. California.

This species is particularly common N. of Reno, where it is easily confused with Cleomella hillmanii A. Nels.

2. CLEOME LUTEA Hook., Fl. Bor. Am. 1: 70, t. 25. 1830. (FIG. 1 e)

Peritoma aurea Nutt. in Jour. Acad. Phila. 7: 15. 1834.

Cleome aurea (Nutt.) Torr. & Gray, Fl. N. Am. 1: 122. 1838.

Peritoma luteum (Hook.) Raf., Sylva Tellur. 112. 1838.

Isexina aurea (Nutt.) Raf., l. c.

Peritoma breviflorum Woot. & Standl. in Contr. U. S. Nat. Herb. 16: 128. 1913.

Cleome breviflora (Woot. & Standl.) Pax & Hoffm. in Engl. & Prantl. Nat. Pflanzenfam. ed. 2, 17^b: 215. 1936.

Erect annual herb, to 15 dm. tall, simple or branched, glabrous (or very sparsely pilose). Leaflets 5 (in upper leaves sometimes 3), narrowly lanceolate- to oblanceolate-elliptic, 2-6 cm. long, to 2 cm. wide. Flowers golden yellow in dense racemes; sepals united for 1/3 their length, persistent in fruit, the lobes narrowly triangular-acute to acuminate; disk large with prominent adaxial appendage.

Siliques fusiform to linear-cylindric, attenuate at both ends, 1-4 cm. long, 2-5 mm. wide; gynophore 4-15 mm. long; pedicel 7-19 mm. long. Seeds ovoid, 3.0-3.5 mm. long, brownish-black or light gray mottled, strongly verrucose, the blisters rounded, hollow and soft, formed by the outermost, delicately colliculate testa.

In Nevada, flowers from May to October.

In dry sandy plains, sand, gravel and rock-deserts, river banks, alkaline plains and mud flats, in sagebrush and creosote-bush assn., or frequently weedy, at 2700-6000 ft. elev.

Nevada: All counties except Douglas, Esmeralda and Eureka. Very common!

Widespread in the W. United States

The plants in Nevada all belong to the typical variety of Cleome lutea, which was described above. Cleome lutea var. jonesii Macbr. (in Contr. Gray Herb. 65: 39. 1922), with longer siliques and larger flowers, occurs from Arizona to Baja California. Some of the collections from S. Nevada may well be transitional to this subspecies.

3. CLEOME SERRULATA Pursh, Fl. Bor. Am. 2: 441. 1816. (FIG. 1 d)

Atalanta serrulata (Pursh) Nutt., Gen. N. Am. Pl. 2: 73. 1818, nom. provis.; Raf. Sylva Tellur. 113. 1838.

Peritoma serrulatum (Pursh) DC., Prodr. 1: 237. 1824.

Peritoma integrifolia Nutt. in Jour. Acad. Phila. 7: 14. 1834.

Cleome integrifolia (Nutt.) Torr. & Gray var. angusta Jones in Proc. Calif. Acad. II. 5: 625. 1895.

Cleome albiflora Cockerell in Proc. Acad. Phila. 48: 34. 1896.

Cleome inornata Greene, Pittonia 4: 16. 1899.

Peritoma inornatum (Greene) Greene, l. c. 4: 210. 1900.

Peritoma serrulatum (Pursh) DC. var. albiflorum (Cockerell) Cockerell in Torreya 2: 42. 1902.

Cleome serrulata Pursh f. albiflora (Cockerell) Cockerell, l. c., in synon.

Peritoma angustum (Jones) Rydb., Fl. Rocky Mts. 371. 1917.

Peritoma serrulatum (Pursh) DC. var. clavatum Lunell in Am. Midl. Nat. 5: 236. 1918.

Cleome serrulata Pursh var. angusta (Jones) Tidestrom in Contr. U. S. Nat. Herb. 25: 249. 1925

Erect annual herb 2-15 (-20) dm. tall, simple or branched, glabrous, glaucous. Leaflets 3, narrowly elliptic, 2-6 cm. long, 0.5-1.5 cm. wide. Flowers bright pink to purplish, rarely white, in very dense racemes. Sepals united at the base for 1/2-2/3 their length, persistent in fruit, the lobes broadly triangular, acute to acuminate; disk large, with prominent adaxial appendage (to 4 mm. long); silique linear-cylindric to fusiform, attenuate at both ends, 2-8 cm. long, 3-9 mm. wide; gynophore 11-23 mm. long; pedicel 14-20 mm. long. Seeds very similar to those to C. lutea (see species No. 2), slightly larger.

Habitats as in C. lutea, at 4000-6200 ft. elev.

In Nevada, flowers from June into September.

Nevada: mainly NW. and N.-central parts: Churchill, Elko, Eureka, Lander, Lincoln, Storey and White Pine Counties.

Widespread in W. North America.

This species is very similar in habit to Cleome lutea. It has

been used for "greens" by the Navajos (E. Palmer) and reputedly has saved tribes from starvation. Cleome serrulata has been in cultivation for nearly half a century as a honey plant, hence the common name "Rocky Mountain Bee Plant".

4. CLEOME SPARSIFOLIA S. Wats. in King Exped. 5 (Bot.): 32, t. 5. 1871.

Type: Humboldt Valley, Watson 132. (FIG. 1 c)

Carsonia sparsifolia (S. Wats.) Greene, Pittonia 4: 211. 1900.

Densely branched, erect, annual herb, 1-6 dm. tall, glabrous, the stem flexuous. Leaves few, soon deciduous, the older plants frequently naked except for the highly reduced upper leaves and bracts. Leaflets 3, less often 1, oblanceolate to obovate- or oblong-elliptic, 3-11 mm. long, 1-3 mm. wide; sepals free, ovate to lanceolate, deciduous; flowers greenish- or lemon-yellow in very open, few-flowered racemes, the strap-shaped petals bearing on their inner base slightly above the level of the disk a papillose, transverse or bipartite nectary which projects into the flower; disk small. Silique linear-cylindric, slightly compressed, acute at both ends, 14-20 mm. long, 2-3 mm. wide, erect or strongly ascending; gynophore 3-6 mm. long; pedicel 5-9 mm. long. Seeds in a single row, obovoid, strongly flattened, 1.6-2.1 mm. long, light gray, mottled with black, the surface minutely colliculate.

In Nevada, flowers from May to September.

In clayey or sandy alkaline deserts, valleys of sagebrush and creosote-bush belts; at 3300-6000 ft. elev.

Nevada: Churchill, Esmeralda, Lyon (Weeks), Mineral, Nye (San Antonio), Pershing (Humboldt Valley) and Washoe (Winnemucca Lake) Counties.

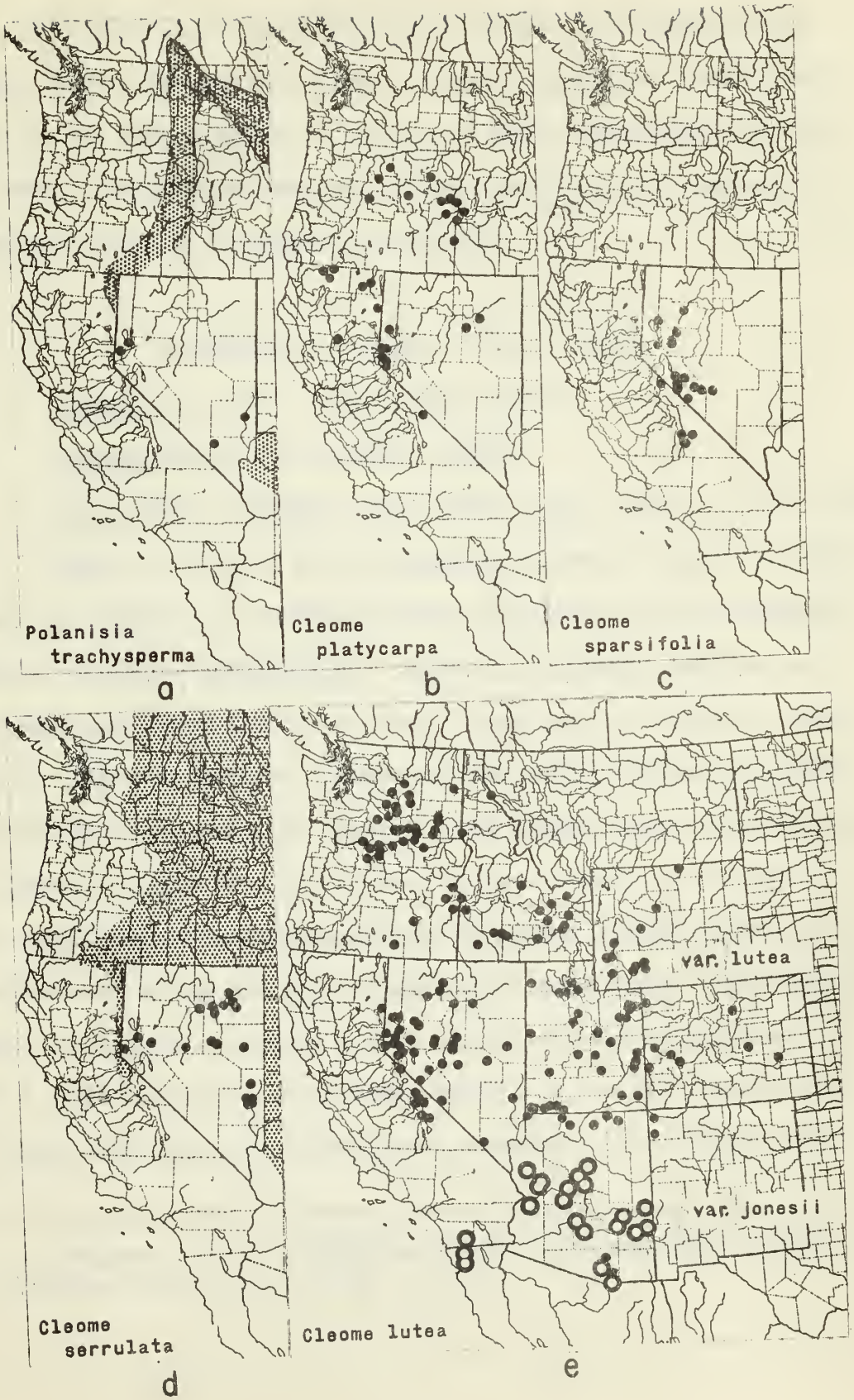
Polanisia
trachysperma
a
Cleome
platycarpa
b
Cleome
sparsifolia
c
Cleome
serrulata
d
Cleome lutea
var. lutea
var. jonesii
e

Fig. 1

An unusual plant, endemic to W. Nevada and adjoining California. In the Western Hemisphere the only Cleome with petal glands, though in the Near East the 11 species of Sect. THYLLACOPHORA Franch. have nearly identical structures. Since unrelated, this represents a remarkable case of convergent evolution!

3. CLEOMELLA DC., Prodr. 1: 237. 1824[1].

Isopara Raf., Alt. Jour. 1: 144. 1832.

Hyponema Raf., Good Book 40. 1840.

Cleome Sect. CLEOMELLA (DC.) Baill., Hist. Plant. 3: 149. 1872.

Erect, or more or less procumbent, unarmed, slender to robust annual (our species) or perennial herbs, 2-40 cm. tall (our species), glabrous (except C. obtusifolia). Leaves 3-foliolate; leaflets entire, mucronate, less than 4 cm. long, stipulate, the stipules minute, filiform. Racemes terminal, bracteate, the bracts either 1-foliolate or the lower 3-foliolate, or flowers borne singly in the axils of cauline leaves. Sepals very small, more or less connate at the base or free, tardily deciduous and persisting in fruit; corolla yellow, closed (convolute) in the bud; petals sessile or subsessile. Disk usually present, very small. Stamens 6, the anthers tightly coiled when dry. Fruit a small obdeltoid, rhomboidal, deltoid or ovoidal silicle, usually wider than long, often compressed contrary to the placenta with

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[1]Payson, E. C., A SYNOPTICAL REVISION OF THE GENUS CLEOMELLA. Univ. Wyoming Publ. Sci. 1: 29-46. 1922.

hemispherical, conical or boat-shaped valves. Silicles borne on very short to elongate gynophores, the indurate, persistent styles short or slender. Seeds 2-12, as in Cleome Sect. PERITOMA, but smaller.

Endemic to W. North America and Mexico (10 species) and very closely related to Cleome Sect. PERITOMA (DC.) Baill., from which it differs principally in characters of the fruit.

KEY TO SPECIES

1. Plants pubescent, with more or less procumbent stems; gynophore strongly deflexed over pedicel; fruiting style 3-4 mm. long (Nye Co.) . . . . . 1. C. OBTUSIFOLIA

1. Plants glabrous, with stems ascending or erect. Gynophore only slightly, if at all, deflexed over pedicel; fruiting style 1-3 mm. long.

2. Gynophore 5-17 mm. long, usually much longer than the silicle. Flowers 3-8 mm. long, borne in well-defined, many-flowered racemes.

3. Inflorescences very dense, many-flowered, showy. Flowers 6-8 mm. long. Petioles of lower leaves 5-8 cm. long, the leaflets broadly oblong to ovate. Seeds round, dull black, with whitish blisters . . . . . 2. C. HILLMANII

3. Inflorescence more open. Flowers 3-5 mm. long. Petioles of lower leaves 0.5-1.5 cm. long, the leaflets linear to linear-oblong. Seeds ovoid, compressed, brown-black mottled, somewhat shiny with minute markings . . . . 3. C. PLOCASPERMA

2. Gynophore 1-2 mm. long, much shorter than the silicle. Flowers

about 2 mm. long, borne in few-flowered racemes or in the axils of cauline leaves.

4. Pedicel (4-) 10-20 mm. long, much longer than gynophore. Plants few-leaved and open; leaflets 10-25 mm. long, 2-3 mm. wide . . . . . 4. C. PARVIFLORA

4. Pedicel 1-2 mm. long, about as long as gynophore. Plants very small, densely leaved; leaflets 5-12 mm. long, 1-2 mm. wide. SW. Nevada (Esmeralda Co.) 5. C. BREVIPES

1. CLEOMELLA OBTUSIFOLIA Torr. & Frem, in Frem., Exped. Rocky Mount. Rpt. 311. 1845 (FIG. 2 a)

Cleomella fremontii Torr. in Smithson. Contr. 3^5: 12. 1852, nom. nud. in synon.

Cleomella obtusifolia Torr. & Frem. var. pubescens Nelson, Proc. Biol. Soc. Wash. 18: 172. 1905.

Cleomella taurocranos Nelson, l. c.

Cleomella obtusifolia Torr. & Frem. var. jonesii Crum ex Jepson, Fl. Calif. 2: 13. 1936.

Cleomella obtusifolia Torr. & Frem. var. florifera Crum ex Jepson, l. c.

Diffusely spreading, densely branched, shrubby annuals to 3 dm. tall, frequently with procumbent branches up to 6 dm. long, more or less pubescent. Leaflets 3, obovate, obtuse to rounded, tipped by a long hair, 3-14 mm. long, 2-6 mm. wide; petioles 5-20 mm. long, stipules about 4 mm. long, resembling tufts of slender white hairs (very prominent in var. pubescens Nelson). Flowers borne at the tips of

short lateral branches, either singly and axillary or in open to very dense terminal, often nearly ebracteate short racemes (in var. florifera Crum). Petals 3-5 mm. long; stamens 5-9 mm. Silicles very variable in shape, 5-8 mm. wide, 2-4 mm. thick, the valves ranging from broad, obtuse cones to narrow, attenuate, slender horns (in the variant described as C. taurocranos Nelson), styles 3-4 mm. long; gynophores 5-10 mm. long, strongly refracted over pedicel; pedicels 5-7 mm. long. Seeds 1-4, suborbicular, about 1.5 mm. long, yellowish, smooth.

Flowers in Nevada from June to September.

Deserts, in sandy or rocky alkaline soils, or abandoned fields, at 3000-4000 ft. elev.

Nevada: Nye Co. (Ash Meadows; Beatty).

Also in the Mojave and Colorado Deserts of California.

The above description applies only to Nevada material. The more abundant California material is very variable, and probably divisible subspecifically, but on other grounds than the habit-varieties of Crum. The variants mentioned in the description come from near Beatty.

Nelson's var. pubescens is based, at least in part, on erroneous morphological interpretation, the "pubescence" being in this case mainly exceptionally well-developed tufts of hair-like stipules.

2. CLEOMELLA HILLMANII A. Nelson in Proc. Biol. Soc. Wash. 18: 171. 1905. Type: Reno, F. H. Hillman s. n.

(FRONTISPIECE & FIG. 2 b)

Cleomella longipes Torr. var. (?) grandiflora S. Wats. in King Exped. 5 (Bot.): 34. 1871. Type: Truckee Valley, S. Watson 137.

Cleomella macbrideana Payson in Univ. Wyoming Publ. Sci. 1: 34. 1922.

Cleomella grandiflora (S. Wats.) Coville in Contr. U. S. Natl. Herb. 25: 250. 1925.

Fairly robust, erect, glabrous, glaucous annual, 10-25 (-35) cm. tall, simple or with 1-5 erect, lateral branches from near the base. Leaflets 3, elliptic, ovate- or broadly obovate-oblong, 8-20 mm. long, 5-10 mm. wide, rounded to emarginate, tipped by a hair. Petioles of lower leaves 2-8 cm. long(!). Racemes many-flowered, very dense and elongate, the bracts oval to suborbicular. Petals 6-8 mm. long. Stamens 8-12 mm. long, the pistil long-exserted. Silicles 5-10 mm. wide, 4-8 mm. long, 4-5 mm. thick, obcordate-triangular to obovate-rhomboidal, the conical valves rounded at the tip; styles 1.5-2.0 mm. long; gynophores (7-) 12-17 mm. long, characteristically purplish; pedicels (10-) 12-16 mm. long. Seeds 2-7, suborbicular, about 2.3-2.8 mm. long, when mature, blackish-brown with thin outer layer of whitish blisters.

Flowers in Nevada from end of April into June.

In shadscale, sagebrush, dry benches and hillsides in sandy desert soils; at 3600-6000 ft. elev.

Nevada: Esmeralda, Mineral (Fish Lake Valley, fide Jepson, Fl. Cal. 2: 14. 1936), Nye (Ione; Lodi Valley), Pershing (Rochester Canyon, Humboldt Range) and Washoe Counties.

Also in SW. Oregon and Salmon, Idaho.

This species is particularly common between Reno and Winnemucca

Lake, where easily confused with Cleome platycarpa Torr.

3. CLEOMELLA PLOCASPERMA S. Wats. in King Exped. 5 (Bot.): 33. 1871.

Type: Ruby Valley, S. Watson 135. (FIG. 2 c)

Cleomella oocarpa A. Gray in Proc. Am. Acad. 11: 72. 1876.

Type: Humboldt Co., Torrey 28.

Cleomella mojavensis Payson in Univ. Wyoming Pub. Sci. 1: 36. 1922.

Cleomella stenosperma Coville ex Tidestrom in Proc. Biol. Soc. Wash. 36: 182. 1923. (based on Cleomella longipes S. Wats. in King Exped. 5 (Bot.): 33. 1871, not C. longipes Torr. in Hook., Kew Jour. 2: 255. 1852). Type: Hot Springs of Grass Valley, Havallah Range, S. Watson 136.

Cleomella plocasperma S. Wats. var. mojavensis (Payson) Crum ex Jepson, Fl. Calif. 2: 14. 1936.

Cleomella plocasperma S. Wats. var. stricta Crum, l. c.

Somewhat robust, erect, glabrous annuals, (3-) 15-40 cm. tall, usually with several diffuse, strongly ascending slender branches. Leaflets 3, linear to linear-oblong, rounded to truncate, 6-30 mm. long, 2-6 mm. wide; petioles 5-12 (-16) mm. long. Racemes many-flowered, rather dense, well-defined at the end of slender branches, the bracts unifoliolate and linear, or lower flowers in the axils of 3-foliolate leaves. Petals 3-5 mm. long; stamens 6-9 mm. long; ovary long-exserted. Silicles ovoid, rhomboidal to obovate-rhomboidal, 4-9 mm. wide, 4-5 mm. long, 3-4 mm. thick, the valves variable, hemispherical, deltoid, or narrowly conical and acute; style about 1 mm.

long, truncate; gynophore (3-) 5-10 mm. long; pedicel (6-) 9-15 mm. long. Seeds 1-5, narrowly obovoid, pointed to the base, compressed, 2.0-2.5 mm. long, 1.3-1.5 mm. wide, smooth, minutely lined, pale gray, mottled with black when mature.

Flowers in Nevada from June to August (October).

In moist, marshy calcareous or dry sandy soil, in alkaline meadows, or in greasewood assn. at 3000-5500 ft. elev.

Nevada: Elko, Esmeralda (Fish Lake Valley, ex Payson, l. c.), Eureka, Lander (S. of Battle Mt.) and Humboldt (Denio Dunes) Counties.

Also in California, SE. Oregon and SW. Idaho.

Very variable in habit, fruit-shape and gynophore length; the Humboldt Co. plants (Denio Dunes) represent a large-fruited extreme; the more common and typical form in Nevada is smaller-fruited, and with shorter gynophores.

4. CLEOMELLA PARVIFLORA A. Gray in Proc. Am. Acad. 6: 520. 1865.

Type: Near Carson City, C. L. Anderson. (FIG. 2 d)

Cleomella gracilis Brandegee in Bot. Gaz. 27: 444. 1899.

Type: Twin Springs, Purpus 6342.

Cleomella alata Eastw. in Zoe 5: 87. 1900.

Slender erect, glabrous annual, simple or few-branched from near the base, 5-25 (-50) cm. tall. Leaves few and far-spaced, nearly sessile or with petioles 1-9 mm. long; leaflets linear-spatulate, rounded, mucronate, about 5-25 mm. long, 2-3 mm. wide. Flowers borne below in the axils of 3-foliolate leaves, above in ill-defined, very lax racemes with 1-foliolate bracts. Petals and stamens about 2 mm. long; pistil

only a little exserted. Silicles globular to obovoid-triangular, 3-4 mm. diam., the valves rounded to obtuse; style about 1/2 mm. long, the stigma bilobate; gynophore about 1 mm. long; pedicel 7-20 mm. long (shorter in depauperate plants). Seeds 4-12, ovoidal, 1.2-1.5 mm. long, 1 mm. thick, yellowish-green with scattered darker blotches, smooth, somewhat shiny.

Flowering in Nevada from June into September.

In alkali flats and meadows near hot springs; at 3500-4500 ft. elev.

Nevada: Elko (Thousand Spring Creek), Lander (W. of Austin), Nye, Ormsby (Eagle Valley, fide Payson) and Washoe Counties.

Also in E. and S. California.

5. CLEOMELLA BREVIPES S. Wats. in Proc. Am. Acad. 17: 365. 1882.

(FIG. 2 e)

Diminutive glabrous annuals, densely branched from near the base, 1-9 (-16) mm. tall, densely clothed with subsessile or short-pedicellate leaves; petioles 1-3 mm. long; leaflets 3, webbed at the base, spatulate to linear-oblong, 5-12 (-17) mm. long, 1-2 mm. wide, or the upper rarely 1-foliolate. Flowers minute, solitary in the axils of nearly all leaves; petals and stamens 1-2 mm. long. Silicle ovoidal to obovoid-rhomboidal, about 2 (-4) mm. diam., the valves rounded (or in Californian material, pointed); style 0.5 mm. long; gynophore 1 (-2) mm. long; pedicel 1.5-2.5 mm. long. Seeds 1-3, narrowly ovoid, 1.7 mm. long, 1.1 mm. wide, 0.8 mm. thick, smooth, yellowish.

In alkaline flats at 3000-4000 ft. elev.

Nevada: Nye Co. (Beatty; Ash Meadows); also in SE. Calif.

A rare Mojave Desert endemic only twice collected in the State, the most specialized species of the genus.

4. WISLIZENIA Engelm. in Wisliz., Mem. Tour. North. Mexico 99. 1848.

Oxystylis, Sect. WISLIZENIA (Englem.) O. Ktze. in Post & O. Ktze., Lex. Gen. Phan. 129. 1903.

Robust, erect glabrous annuals (ours) or suffruticose perennials, sparsely to very densely divaricately branched; leaves 3-foliolate, or the upper 1-foliolate, the leaflets less than 4 cm. long, entire, mucronulate; stipules minute tufts of filiform hairs to 3 mm. long. Racemes terminal, ebracteate, dense, not markedly elongating in fruit; sepals minute, tardily deciduous. Corolla closed in bud; petals yellow, subsessile; disk small; stamens 6, the anthers tightly coiled when dry. Fruit a schizocarp with two divaricate or deflexed, obovoid to obconical nutlets, each containing 1 (rarely 2) seeds which are permanently and closely invested by the capsule valves; placenta (replum) reduced to tiny ring 1 mm. or less in diam.; style, gynophore and pedicel slender. Seeds obovoid, pointed, with fused claws.

A monotypic, highly polymorphic genus.

1. WISLIZENIA REFRACTA Engelm. in Wisliz., Mem. Tour. North. Mexico 99. 1848. (FIG. 2 f)

Wislizenia melilotioides Greene in Proc. Biol. Soc. Wash. 19: 130. 1906.

Wislizenia refracta Engelm. var. melilotioides (Greene) Johnston in Proc. Cal. Acad. Sci. 4th Ser. 12: 1027. 1924, and other synonyms not described from the range of this manual.

In Nevada: Annuals 4-7 dm. tall. Leaflets oblanceolate, elliptic to oblong-obovate, 5-35 mm. long, 3-10 mm. wide, the apex rounded, the base attenuated into slender petiolules to 3 mm. long; petioles 5-25 mm. long. Racemes 0.5-3.0 cm. long, very dense, at the tip of each branch. Petals 2-3 mm. long; stamens 6-7 mm. long; pistil long-exserted. Nutlets obovoidal, 2.5 mm. long, 1.5 mm. thick, minutely tuberculate at the distal end, usually 1-seeded, the seed smooth, yellow; style 5-6 mm. long, very slender; gynophore 5-6 mm. long, strongly refracted over a pedicel of equal length.

Flowers in Nevada from July to September.

Desert roadsides at 3500-4100 ft. elev.

Nevada: Lincoln Co. (Pahranagat Valley: Crystal, Hiko and Bennett Springs).

W. Texas and northern Mexico to Baja California, Nevada and New Mexico.

All Nevada collections referable to the dubious var. melilotioides (Greene) Johnston of more SE. range. Perhaps introduced!

5. OXYSTYLIS Torr. & Frem., Second Rep. 312. 1845.

Erect, glabrous, strict and robust annuals, 3-10 dm. tall, usually unbranched or with 1-4 (-?) strongly ascending, lateral branches. Leaflets 3, entire, ovate to oblong-elliptic, obtuse, 20-42 mm. long, 8-25 mm. wide; petioles 2-7 cm. long, both petioles and leaflets

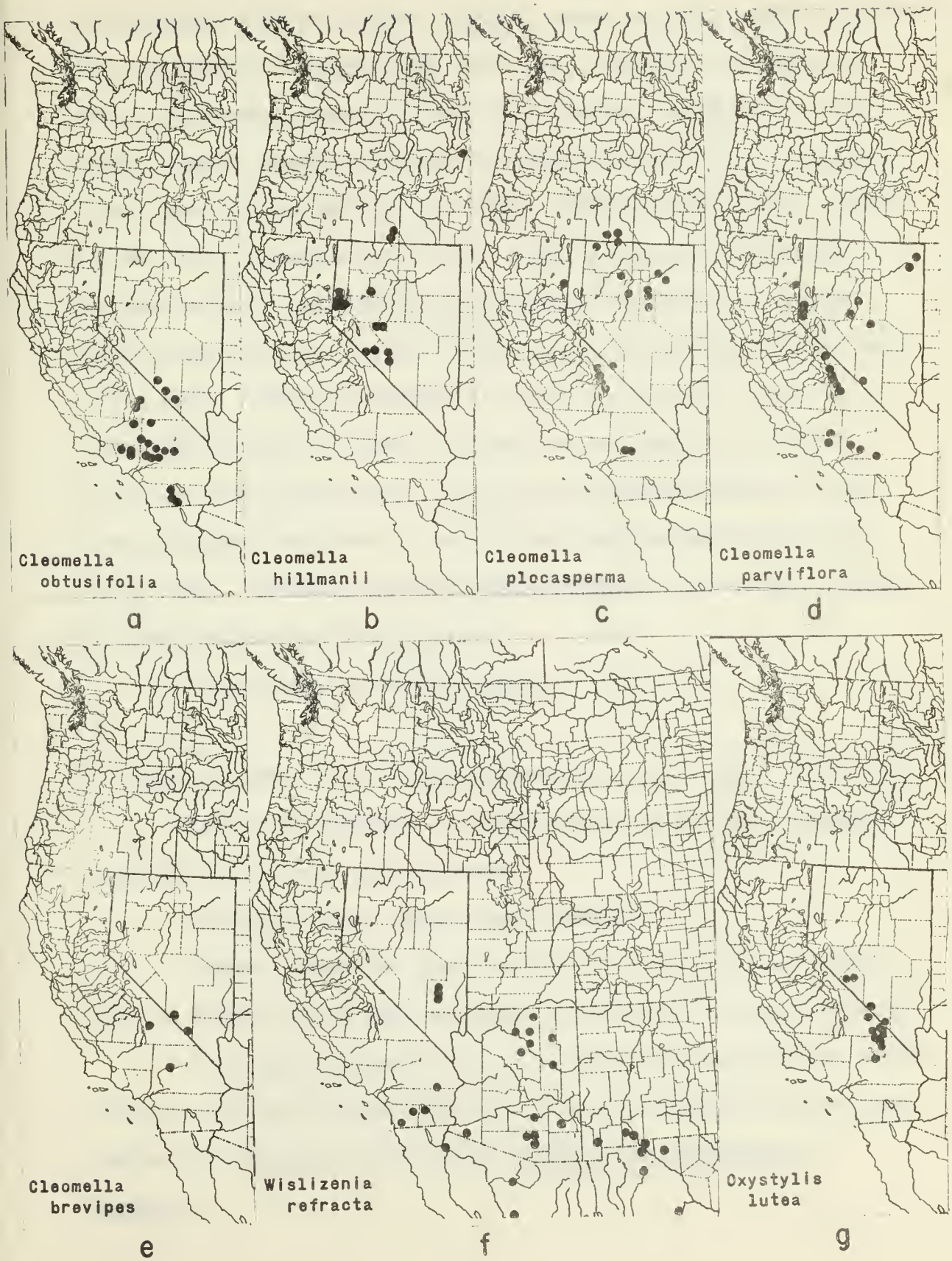
Cleomella obtusifolia
Cleomella hillmanii
Cleomella plocasperma
Cleomella parviflora
a
b
c
d
Cleomella brevipes
Wislizenia refracta
Oxystylis lutea
e
f
g

Fig. 2

progressively reduced upwards; stipules minute scarious scales with filiform projections. Racemes very short (to 1 cm.), not elongating in fruit, ebracteate, densely covered with stipules, aggregated in very dense, sessile, headlike clusters ("burrs"), about 1-2 cm. or less in diam., borne in the axils of each leaf. Sepals minute; petals yellow, 2-4 mm. long; stamens 4-5 mm. long. Fruit a didymous schizocarp; the two thin valves, each tightly and permanently enclosing its single seed to form a nutlet, project downward from the greatly enlarged base of the style. Nutlets obovoidal, 2.5 mm. long, 2.0 mm. wide, 1.4 mm. thick, smooth, dull yellowish to deep purple, tardily deciduous; style very stout, spinescent, 7-9 mm. long, broadly expanded at the base; gynophore very stout, 1 mm. or less long; pedicel very stout, 1-2 mm. long. Fruiting axillary raceme-clusters 2-3 cm. diam., woody, with many projecting spiny styles.

A monotypic, monomorphic genus.

1. OXYSTYLIS LUTEA Torr. & Frem., Second Rep. 313. 1845. (FIG. 2 g)

Flowers sporadically at various times of the year, apparently depending on the local precipitation.

In dry alkaline, sandy desert habitats.

Nevada: Esmeralda (near Coaldale) and Nye (Amargosa Desert, Clayton Valley and Ash Meadows, Death Valley River drainage) Counties.

This unique endemic of the Californian and Nevadan Death Valley region is the final genus in a fruit and raceme reduction series which, starting with Cleome, leads through Cleomella and Wislizenia to Oxystylis.